

17 the visco-elastic member being disposed in a substantial center of the
18 piezoelectric vibrator,

19 the visco-elastic member having a bottom face area which accounts
20 for about 11% to about 80% of a bottom face area of the diaphragm,

21 the visco-elastic member comprising first and second visco-elastic
22 members provided on opposite sides of the piezoelectric vibrator, and

23 the first and second visco-elastic members comprising different
24 materials or different shapes.

1 2. (As Amended) A piezoelectric loudspeaker comprising:

2 a piezoelectric vibrator including a diaphragm and a piezoelectric
3 member provided on at least one face of the diaphragm, the diaphragm being
4 vibrated by the piezoelectric member;

5 a frame for supporting the piezoelectric vibrator; and

6 a visco-elastic member provided on at least one face of the
7 piezoelectric vibrator,

8 the visco-elastic member being disposed in a substantial center of the
9 piezoelectric vibrator,

10 the visco-elastic member having a bottom face area which accounts
11 for about 11% to about 80% of a bottom face area of the diaphragm,

12 the visco-elastic member including two or more visco-elastic
13 members stacked on top of each other, and

14 the two or more visco-elastic members comprising different
15 materials or different shapes.

1 5. (As Amended) A piezoelectric loudspeaker comprising:

2 a piezoelectric vibrator including a diaphragm and a piezoelectric
3 member provided on at least one face of the diaphragm, the diaphragm being
4 vibrated by the piezoelectric member;

5 a frame for supporting the piezoelectric vibrator; and

6 a visco-elastic member provided on at least one face of the
7 piezoelectric vibrator,

8 the visco-elastic member being disposed in a substantial center of the
9 piezoelectric vibrator,

10 the visco-elastic member having a bottom face area which accounts
11 for about 11% to about 80% of a bottom face area of the diaphragm,

12 the visco-elastic member comprising two or more visco-elastic
13 members having mutually different values in at least one of specific gravity,
14 Young's modulus, and internal loss, and

15 the two or more visco-elastic members are disposed in a concentric
16 manner.

1 7. (As Amended) A piezoelectric loudspeaker comprising:

2 a piezoelectric vibrator including a diaphragm and a piezoelectric
3 member provided on at least one face of the diaphragm, the diaphragm being
4 vibrated by the piezoelectric member;

5 a frame for supporting the piezoelectric vibrator; and

6 a visco-elastic member provided on at least one face of the
7 piezoelectric vibrator,

8 the visco-elastic member being disposed in a substantial center of the
9 piezoelectric vibrator,

10 the visco-elastic member having a bottom face area which accounts
11 for about 11% to about 80% of a bottom face area of the diaphragm, and

12 the piezoelectric vibrator having at least one aperture, the at least one
13 aperture being at least partially filled by the visco-elastic member.

1 8. (As Amended) A piezoelectric loudspeaker comprising:

2 a piezoelectric vibrator including a diaphragm and a piezoelectric
3 member provided on at least one face of the diaphragm, the diaphragm being
4 vibrated by the piezoelectric member;

5 a frame for supporting the piezoelectric vibrator; and

6 a visco-elastic member provided on at least one face of the
7 piezoelectric vibrator,

8 the visco-elastic member being disposed in a substantial center of the
9 piezoelectric vibrator,

10 the visco-elastic member having a bottom face area which accounts
11 for about 11% to about 80% of a bottom face area of the diaphragm,

12 the frame having a horn-like configuration including an opening, the
13 opening having a gradually increasing cross-sectional area away from the
14 piezoelectric vibrator and toward a final opening at which soundwaves are emitted,
15 and

16 the visco-elastic member having a conical configuration having a
17 gradually decreasing cross-sectional area away from the piezoelectric vibrator and
18 toward the final opening.

1 10. (As Amended) A piezoelectric loudspeaker comprising:

2 a piezoelectric vibrator including a diaphragm and a piezoelectric
3 member provided on at least one face of the diaphragm, the diaphragm being
4 vibrated by the piezoelectric member;

5 a frame for supporting the piezoelectric vibrator; and

6 a visco-elastic member provided on at least one face of the
7 piezoelectric vibrator,

8 the visco-elastic member being disposed in a substantial center of the
9 piezoelectric vibrator,

10 the visco-elastic member having a bottom face area which accounts
11 for about 11% to about 80% of a bottom face area of the diaphragm,

12 the visco-elastic member including notches in at least one portion
13 thereof.

1 11. (As Amended) A piezoelectric loudspeaker comprising:

2 a piezoelectric vibrator including a diaphragm and a piezoelectric
3 member provided on at least one face of the diaphragm, the diaphragm being
4 vibrated by the piezoelectric member;

5 a frame for supporting the piezoelectric vibrator; and

6 a support element for supporting the piezoelectric vibrator at a
7 substantial center of the piezoelectric vibrator,

8 the support element including a conductive portion in electrical
9 contact with the piezoelectric vibrator, and an electrical input is applied to the
10 piezoelectric member via the conductive portion, causing the piezoelectric vibrator
11 to vibrate.

1 14. (As Amended) A piezoelectric loudspeaker comprising:

2 a piezoelectric vibrator including a diaphragm and a plurality of
3 piezoelectric members provided on at least one face of the diaphragm, the
4 diaphragm being vibrated by the plurality of piezoelectric members; and

5 a frame for supporting the piezoelectric vibrator,

6 wherein different voltages are applied to at least two of the plurality
7 of piezoelectric members, and

15
16 (b) 8 the plurality of piezoelectric members being defined by at least two
17 9 split sections of the visco-elastic member provided on at least one face of the
18 10 piezoelectric vibrator.

1 18. (As Amended) A piezoelectric loudspeaker comprising:
2 a voltage applying means for applying a plurality of voltages;
3 a piezoelectric vibrator including a diaphragm and a plurality of
4 piezoelectric members provided on at least one face of the diaphragm, the
5 diaphragm being vibrated by the plurality of piezoelectric members;
6 a frame for supporting the piezoelectric vibrator;
7 wherein at least two of the plurality of piezoelectric members have a
8 different voltage applied thereto from the voltage applying means; and
9 an electrically resistant element for interconnecting at least two of
10 the plurality of piezoelectric members.

11 19. (As Amended) A piezoelectric loudspeaker comprising:
12 a piezoelectric vibrator including a diaphragm and a piezoelectric
13 member provided on at least one face of the diaphragm, the diaphragm being
14 vibrated by the piezoelectric member;
15 a frame for supporting the piezoelectric vibrator;
16 a visco-elastic member provided on at least one face of the
17 piezoelectric vibrator, the visco-elastic member being disposed in a substantial
18 center of the piezoelectric vibrator, and the visco-elastic member having a bottom
19 face area which accounts for about 11% to about 80% of a bottom face area of the
20 diaphragm; and
21 a plate for connecting at least one said visco-elastic member to the
22 frame so as to damp unwanted vibration of the piezoelectric vibrator, an enclosed
23 space being formed by the plate, the frame, and the diaphragm.

1 25. (As Amended) A piezoelectric loudspeaker comprising:

2 a piezoelectric vibrator including a diaphragm and a piezoelectric
3 member provided on at least one face of the diaphragm, the diaphragm being
4 vibrated by the piezoelectric member;

5 a frame for supporting the piezoelectric vibrator; and

6 a visco-elastic member provided on at least one face of the
7 piezoelectric vibrator,
8 the visco-elastic member being disposed in a substantial center of the
9 piezoelectric vibrator,

10 the visco-elastic member having a bottom face area which accounts
11 for about 11% to about 80% of a bottom face area of the diaphragm,

12 the bottom face area of the visco-elastic member is equal to or
13 greater than the bottom face area of the piezoelectric member, and a diameter of
14 the visco-elastic member is smaller than the inner diameter of the frame, and

15 the visco-elastic member covering an entire upper face of the
16 piezoelectric member.

1 Please add new claim 27.

1 27. (Newly Added) A piezoelectric loudspeaker comprising:

2 a piezoelectric vibrator including a diaphragm and a piezoelectric
3 member provided on at least one face of the diaphragm, the diaphragm being
4 vibrated by the piezoelectric member;

5 a frame for supporting the piezoelectric vibrator; and

6 a visco-elastic member provided on at least one face of the
7 piezoelectric vibrator,

8 the visco-elastic member being disposed in a substantial center of the
9 piezoelectric vibrator,

10 the visco-elastic member having a bottom face area which accounts
11 for about 11% to about 80% of a bottom face area of the diaphragm, and

12 the visco-elastic member having a conical configuration having a
13 gradually decreasing cross-sectional area away from the piezoelectric vibrator and
14 toward a final opening.

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